REMARKS

The foregoing amendment amends claim 7 for purposes of clarity. Pending in the application are claims 1-7, of which claims 1, 3 and 7 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Objections to the Specification

Regarding the objection to the abstract for use of legal phraseology, Applicants have amended the abstract to comply with the Patent Office requirements and request that the objection be reconsidered and withdrawn.

35 U.S.C. 112 Rejections

Applicants thank the Examiner for the close review of the claims. The Examiner rejects claims 1 and 2 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants respectfully traverse the rejection and submit that all of the features of claims 1 and 2 are sufficiently supported by the disclosure so as to enable one skilled in the art to make and/or use the invention.

According to the Examiner, the drawings and the specification do not disclose a "compressor controlling the fuel gas flow to the fuel cell or a pressure control valve provided downstream of the fuel cell controlling the fuel gas to the fuel cell" as recite in claim 1. Applicants initially note that the Examiner's reading of the claim is incorrect, as claim 1 does not recite that the compressor controls *fuel gas flow*, but rather the "amount of the <u>gas</u> to be supplied into the fuel cell", which can be air, oxygen or another gas supplied to the cathode or anode of the fuel cell. Claim 1 also does not recite that the pressure control valve controls the *fuel gas* to the fuel cell, as alleged by the Examiner, but rather, that the pressure control valve "controls the <u>gas pressure</u> of the fuel cell" (emphasis added).

Furthermore, the recited compressor and pressure control valve are adequately described and shown in both the specification and the drawings. For example, a compressor for controlling the fuel gas flow to the fuel cell is designated by reference number 7B in Figure 1, as the specification recites that the supercharger (S/C) 7B serves as a <u>compressor</u> on page 9, lines 19-20. The specification also discloses, at least, for example, on page 10, lines 15-21, that the "supercharger (S/C) 7B can be driven at a rotation speed ranging from 0 to 12,000 rpm, and can linearly <u>change an airflow amount</u> Q depending upon the rotation speed..." (emphasis added). Therefore, a compressor, i.e., a supercharger, that controls an amount of the gas to be supplied into the fuel cell is clearly disclosed and enabled in the specification and drawings of the present application.

A pressure control valve for controlling the gas pressure of the fuel cell and provided on the downstream of the fuel cell is designated by reference number 8A in Figure 1. The recited pressure control valve 8A is also sufficiently described throughout the specification, at least, for example on page 11, lines 6-12 and page 13, lines 3-11. For example, on page 11, line 6, the specification reads "[t]he air exhaust system 8 of the fuel cell (FC) 8 has a backpressure control valve 8A for controlling <u>air pressure</u> P at the cathode inlet side of the fuel cell (FC) 3. The backpressure control valve 8A has a CV value (capacity of valve) of about 8.5 and the valve-opening speed of approximately 8,000 degree/sec. In the backpressure control valve 8A, the opening is controlled at a interval of 10 ms." (emphasis added.) The specification further discloses, on page 13, lines 3-11, that "during the transition period...the airflow amount Q is gradually changed toward the target airflow amount according to the change in a target power generation amount, the opening of the backpressure control valve 8A is controlled one after another corresponding to the change in the airflow amount Q, which is detected by the flow sensor 7D one after another whereby air pressure control means, which controls the air pressure P during the transition period is controlled one after another is configured." In at least these instances, a pressure control valve which controls the gas pressure of the fuel cell and which is provided on the downstream of the fuel cell is clearly disclosed and enabled.

As both features cited by the Examiner are adequately disclosed and enabled in the specification, it is respectfully requested that the rejection of claim 1 for lack of enablement be reconsidered and withdrawn.

Regarding the rejection of claim 2, under 35 U.S.C. 112, Applicants submit that the flow amount feedback control step and the pressure feedback control step recited in claim 2 are adequately enabled by the specification. For example, in the flow amount feedback control step, the flow amount of the gas supplied into a fuel cell is controlled to be a prescribed value, i.e., the flow amount is constant in periods other than the transition period. The pressure feedback control step is performed in periods other than the transition period, to maintain the pressure of the fuel cell at a prescribed value. The fact that the claim recites certain steps that are performed when the fuel cell is not in a transition period, and specifies that these steps stop during a transition period of the fuel cell does not preclude the fuel cell from being controlled using other suitable control steps or control means *during* a transition period. For example, it is within the scope of claim 2 that when the fuel cell enters a transition period, the recited flow amount feedback control step and the pressure feedback control step are stopped and, during the transition period, the flow amount of supply gas is *changed* from the prescribed value to a different value, after which the pressure of the fuel cell is *changed* from the prescribed value to a different value by changing the opening of the pressure control valve. Since claim 2 only recites that certain feedback steps stop during the transition period without placing limitations on other control steps during the transition period, Applicants submit that claim 2 is adequately enabled and request that the rejection be reconsidered and withdrawn.

35 U.S.C. 102 Rejections

In the Office Action, the Examiner rejects claims 1 and 3-7 under 35 U.S.C. 102(b) as being anticipated by Merritt et al. (U.S. Patent Number 5,366,821). The Examiner rejects claims 1 and 3-7 under 35 U.S.C. 102(e) as being anticipated by Scheffler et al. (U.S. Patent Number 6,393,354). The Examiner rejects claims 1 and 3-7 under 35 U.S.C. 102(b) as being anticipated by the JPO abstract for JP 61-080762 A. Applicants traverse the rejections of claims 1 and 3-7 under 35 U.S.C. 102 and submit that the claims distinguish patentably over the Merritt reference, the Scheffler reference and the JP '762 reference.

The Merritt reference is directed to a constant voltage fuel cell, which is fed a reactant gas, such as an oxidant gas. The Merritt reference does not teach or suggest changing an amount

of supply gas supplied by a compressor during *a transition period* of a fuel cell, as recited in claims 1 and 7. Moreover, the fuel cell Merritt does not appear to even have a period of operation corresponding to the transition period of the present invention where the target power generation amount varies, because the Merritt fuel cell provides a <u>constant output</u> voltage, which does not vary.

The Merritt reference suggests that the oxidant gas flow can be adjusted either (1) to keep the output voltage constant for any current load, or (2) to provide optimal operation in which the parasitic power (mostly utilized to operate a compressor) is minimized, or (3) to maintain a fixed oxygen utilization ratio. In one embodiment, the pressure of the oxidant gas rises and falls in order to regulate stack voltage. Alternatively, the mass flow rate and/or the reactant utilization ratio of the oxidant gas in the fuel cell are changed depending on the output current of the fuel cell to change the amount of parasitic power drawn from the fuel cell. The parasitic power is used to power a compressor 330, which is used to change the <u>pressure</u> of the oxidant gas on the oxidant source side of the fuel cell. The compressor 330 is a variable-speed, constant displacement compressor driven by a motor. The compressor provides compressed air to a storage tank, which has a setpoint pressure, and the compressor is utilized to maintain the setpoint pressure in the air storage tank. A pressure controller 345 controls the speed of the motor, which is varied to change the air mass flow rate and pressure of the oxidant gas. The fuel cell of Merritt includes a variable-orifice control valve 180 for controlling the oxidant <u>flow rate</u> through the system to vent dehumidified oxidant gas to the atmosphere. The dehumidified oxidant gas comprises gas that is discharged from the fuel cell and separated from water contained therein. In Merritt, flow regulation is accomplished by calculating a desired flow rate, monitoring the air flow input to and current output of the fuel cell, and regulating the air flow through the fuel cell by means of flow control valves. The Merritt reference does not, however, teach or suggest changing an amount of a supply gas supplied by a compressor during a *transition period* of the fuel cell, as recited in claims 1 and 7.

In addition, the variable-orifice control valve 180 described in Merritt does not appear to control the <u>pressure</u> of the fuel cell, as recited in claims 1 and 3. Rather, the variable-orifice control valve 180 in Merritt is used to control the *flow rate* of the oxidant gas through the system, as set forth in column 8, lines 38-44.

Furthermore, the compressor 330 in Merritt is used to vary the *pressure* of the input oxidant gas, rather than the <u>amount</u> of gas to be supplied into the fuel cell, as recited in claims 1 and 3.

Regarding claim 3, the Merritt reference does not teach a compressor that controls the amount of gas to be supplied into a fuel cell. The Merritt reference also does not teach or suggest setting a target airflow amount that corresponds to a target power generation amount and controlling the airflow toward the cathode inlet side of the fuel cell to be the target airflow amount by controlling the revolution number of a compressor. The Merritt reference also does not teach or suggest controlling a pressure control valve based on a change in an airflow amount during a transition period.

Regarding claim 7, the Merritt reference also does not appear to teach or suggest gradually changing an airflow amount during a transition period.

The Examiner's rejection of claims 1 and 3-7 as being anticipated by the Scheffler reference under 35 U.S.C. 102(e), is improper, because the United States filing date of the Scheffler reference, which is December 13, 2000, is <u>*after*</u> the priority date of the present invention, which is July 25, 2000. Therefore, the Scheffler reference does not qualify as prior art for the present application. In the Office Action, the Examiner acknowledged received of the priority document for the present application, i.e., Japanese Patent Application, First Publication No. 2000-223194. The priority document certifies that the content of the present application is the same as that of the priority document and is therefore entitled to the July 25, 2000 filing date. Because the Scheffler reference was not filed in the United States before the invention by the Applicants, Applicants request that the rejection of claims 1 and 3-7 under 35 U.S.C. 102(e) based on the Scheffler reference be withdrawn.

Even so, the Scheffler reference does not describe the claimed invention. The Scheffler reference describes a system and method for controlling a fuel cell. In Scheffler, a load demand device provides input to the system for establishing a load demand. Based on a load signal, the system regulates one of more of the reactants or coolants for the fuel cell. The oxidant or fuel

gas is controlled using a control valve and/or an air blower motor. However, the Scheffler reference does not appear to describe a compressor for controlling an amount of gas to be supplied into the fuel cell, or a pressure control valve downstream of fuel cell for controlling a gas pressure in fuel cell, as recited in claims 1 and 3.

The JP 61080762 reference describes a fuel cell power generation system that controls a compressor discharge pressure and a nozzle of a turbine, which discharges an increase in pressure from the compressor to the air. The JP 61080762 compressor does not control an amount of gas to be supplied to a fuel cell. Furthermore, the JP 61080762 does not teach or suggest a pressure control valve downstream of a fuel cell.

For at least the foregoing reasons, claims 1-7 are patentable over the cited references. As such, Applicants respectfully request that the rejection of claims 1-7 under 35 U.S.C. 102 be reconsidered and withdrawn.

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. IIW-006 from which the undersigned is authorized to draw.

If, however, the Examiner considers that obstacles to allowance of these claims persist, we invite a telephone call to Applicants' representative.

Dated: January 6, 2004

Respectfully submitted,

By Anthony Laurentano

Anthony A. Laurentano
Registration No.: 38,220
LAHIVE & COCKFIELD, LLP
28 State Street
Boston, Massachusetts 02109
(617) 227-7400
(617) 742-4214 (Fax)
Attorney for Applicants